Knowledge Superiority as a Navy Way of Life

U.S. Navy photos

by Alex Bennet

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For over 200 years the Department of the Navy has recognized the importance and necessity of assuring that our forces are deployed in strategic locations to enable quick response worldwide. We call this key maritime strategy "forward presence." At all times, approximately one third of the Naval Fleet and Fleet Marine Force are deployed in such places as the Pacific Ocean, the Persian Gulf, and the Mediterranean and Philippine Seas. This means that over 40,000 military members are away from their families serving in defense of their country at any given time.

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Now knowledge superiority joins forward presence as a core element of the Department of the Navy's maritime strategy. "Knowledge superiority" means sustainable competitive advantage over our adversaries by means of dramatically enhancing our knowledge of the battlespace. Knowledge superiority accelerates commanders' decision-making processes, enabling them to effectively lock out a foe's intended actions and overcome his defenses. At a workshop held in the fall of 1999 at the U.S. Naval Academy, senior military and civilian personnel shaped the knowledge superiority vision for the Department in this way:

> More than any other nation, more than any other Navy, and more than ever before, we rely on the creativity, ingenuity, and intellect of our people. As we cross the threshold of the Information Age, we intend to realize this awesome potential in every corner of our Navy, by every person, as a highly interactive total team. Transcending even our current advantage in physical firepower, **our Navy will be alive with the fire of shared understanding.** We will do this because we must for our Navy's relevance and readiness in this new era. No

foe, present or future, will match our knowledge or our ability to apply it. Indeed, just as forward presence has become a way of life for us, so too will knowledge superiority become a Navy way of life.[1]

Identifying knowledge superiority as a key component of the Department of the Navy's maritime strategy did not occur in a vacuum. Like knowledge management in general, the concept developed along with the emergence of potent new technologies. Historically, the tools and tactics of warfare have evolved side by side with new technologies. It is not surprising then that the concept of network-centric warfare, a key element of knowledge superiority, evolved as the global network came into being. Network-centric warfare gives the Navy an information advantage through development of a network which supports interoperability, collaboration and synchronization. It derives its power from the robust, rapid networking of well-informed, geographically dispersed forces. The Naval War College has been examining network-centric warfare since early 1998 and has used the annual Global War Game to provide a robust operational research environment, with its recently constructed Strategic Maritime Research Center as the nucleus. Last year's war gaming series, Global 2000, was designed and executed to better simulate the future network-centric environment, putting theories of knowledge superiority and knowledge centric operations into practice. Several knowledge management initiatives were created in the Global 2000 war game.

Knowledge management addresses the organizational and human processes necessary to realize fully the potential of increased access to information made possible by network-centric operations. Knowledge superiority integrates the concepts of network-centric warfare, information warfare and knowledge management to achieve the optimum competitive advantage in warfare. This integration is the cornerstone of the Department's strategic approach to implementation. Information technology, information management and knowledge management are connected layers built upon a strong, supportive infrastructure. Each successive layer must be in place to do the next successfully, yet the full value of any layer cannot be achieved without success throughout all four. The right technology investment enhances good information management, which informs good knowledge management. In general, the Navy has known that using information to create knowledge which can drive improved decision-making and performance is the ultimate desired outcome. This point of view is clearly articulated in the Information Management/Information Technology (IM/IT) Strategic Plan issued by the Secretary of the Navy, the Chief of Naval Operations and the Commandant of the Marine Corps. The vision of the future presented in the Strategic Plan is:

- An integrated, results-oriented Navy and Marine Corps team characterized by strategic leadership, ubiquitous communication, and invisible technology
- An effective, flexible, and sustainable enterprise-wide information and technology environment that enables our people to make and implement efficient and agile decisions
- A knowledge-centric culture where trust and respect facilitate information sharing and organizational learning

Only by addressing all of these issues—infrastructure, processes, organization, and culture—will the Department achieve and sustain knowledge superiority.

Nine strategic goals support this vision. The first four goals are: building the infrastructure to ensure information superiority and connectivity, reengineering battle and business processes in parallel with technology infusion, managing the risk associated with IT investments, and implementing strategies that facilitate the creation and sharing of knowledge. Additional goals address the critical issues of information security, the workforce, and cultural change.

A critical facet of the IM/IT Strategic Plan is using "pathfinders," success stories gathered during the strategic planning process, to showcase initiatives that are achieving the Department's vision of the future. Although the pathfinders currently in use date from two years ago, the initiatives and programs they represent exemplify important innovations and efficiencies. As knowledge management experience in other arenas shows, stories of real-life success increase understanding and commitment. Today, new pathfinders are emerging in a technology-energized knowledge environment. Pathfinders contribute to the aims of developing the knowledge-centric infrastructure, defining the processes and organizational structures that will make best use of the infrastructure, and creating a knowledge-centric culture. Only by addressing all of these issues—infrastructure, processes, organization, and culture—will the Department achieve and sustain knowledge superiority.

DEVELOPING A KNOWLEDGE-CENTRIC INFRASTRUCTURE

A technologically advanced, seamless infrastructure is essential to facilitate the collaboration and free flow of information that enable effective decision-making. A first step to achieving this infrastructure is the development of the Navy Marine Corps Intranet and its enterprise portal, *The Port*.

The overarching importance of information management and knowledge management to improve decision-making led the Navy to conclude that managing information, and creating and sharing knowledge—rather than owning the necessary technology—were the primary IM/IT business of the Department. If the information technology infrastructure we used did not need to be owned, it could be treated as a service, much like our telephone support systems, and would not divert attention from those primary tasks.

In October 2000, after a year-long exploration of the feasibility of this approach, the Navy awarded a contract to Electronic Data Systems to provide an all-encompassing information/communications solution. This solution, the Navy Marine Corps Intranet (NMCI), will give civilians, sailors and Marines access to the rich intellectual resources that extend throughout the Naval enterprise. Replacing the Navy's numerous shore-based networks, NMCI will provide data, video, and voice services to Navy and Marine Corps personnel, to ensure access, interoperability, and security for our information and communications needs. Coupled with the Navy's shipboard system and the Marines' tactical network, the intranet will give sailors and Marines on the front lines direct access to the network of people, information and knowledge available in government,

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industry and academia. NMCI makes connectivity transparent; our forward-deployed forces will have immediate access to the best resources available, a "reachback" capability that provides the knowledge they need to make critical mission decisions.

As an example of how NMCI will work, imagine this scenario.

While forward-deployed, Marine Gunnery Sergeant Jackson sees unusual patterns on his detection device, indicating the possible presence of a biological agent. Keying into his laptop, he reaches back to the experts at the Centers for Disease Control in Atlanta for advice, and transmits the information from his biological agent detection device. Knowledge management systems quickly process and analyze historical and other existing data to determine the threat level. The Gunnery Sergeant is immediately linked to Fort Dietrick, Maryland, for appropriate procedures, which are downloaded to his laptop, and immediately distributed to his platoon. Simultaneously, the Joint Command Center is alerted and nearby platoons are warned of possible biological attack.

The biggest hurdles to collaboration are the cultural, technological and business issues which arise from outdated "stove-piped" structures and mind-sets, and disparate IT architectures and applications. Effective connectivity, in contrast, amplifies power. Appropriate portal strategies and architectures facilitate interoperability between new and old systems, thus reducing manpower, costs, and delays. Portal technology enables commands to leverage this interoperability and collaboration to achieve faster processes, planning, and execution. Those in the knowledge management world realize that connectivity and interoperability are necessary but insufficient for individuals to make the best decisions, however. An important second step is the creation of *The Port* that will serve as home base for every sailor, civilian and Marine using the Intranet.

The mission of *The Port* is to provide all personnel with a fully customizable, web-enabled portal allowing access to the Department's electronic information assets. The portal will achieve this result by developing global connectivity to Department-approved, common applications and authoritative data sources. *The Port* will improve business innovation by consolidating potential markets and customers currently scattered on disparate networks throughout the organization. Through the portal, each organizational unit will have a common framework with the flexibility to support local users by bringing local information, consumers and suppliers together. Users are not islands unto themselves: given information, they need to take action—often collaboratively. This customizable portal simultaneously supports the needs of individuals and groups. It will enable users to leverage expertise, share insights, and implement policy and strategy changes in real-time or through shared databases. Instead of being merely a passive information kiosk, the portal will facilitate organizational interactions among employees, customers, partners, and other stakeholders.

The Port supports a new concept about how to manage the intellectual capital of the Navy: "enterprise content integration." The following scenario suggests what this concept means to the Department.

Right after the Department of the Navy awarded the Navy Marine Corps Intranet contract my boss asked me to do some serious thinking about the use of virtual collaboration and communities of practice, serious enough that he wanted a white paper on his desk within the next couple of weeks.

I knew there were a couple of recently published articles focused on virtual collaboration, and the concept of "communities of practice" had been introduced in Knowledge Management presentations. Deciding to take a look at other material on communities, I stopped by the George Mason University Library on the way home. The Library has a virtual catalog based on the Dewey Decimal System that identifies sources not only in the library itself, but throughout a consortium of libraries. Materials can be searched by subject and author, and once you find the right spot on the shelves using a map of the stacks, related topics are readily available as well, even without specific subjects and titles. I found several germane articles and dozens of recent texts by experts upon which to build my white paper.

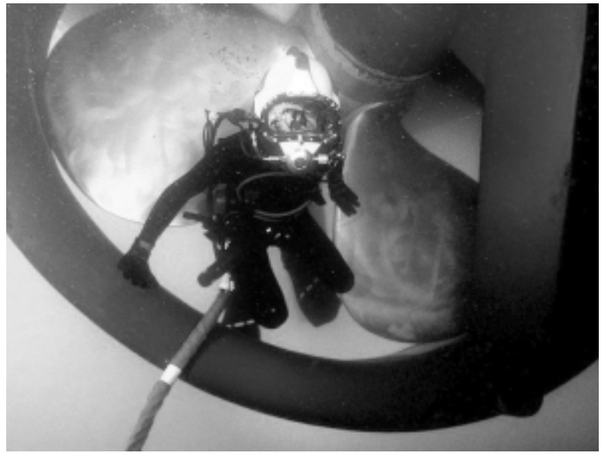
It occurred to me that NMCI will support this same process. If the wires and structure of NMCI are like the building and the fixtures of the library, then the NMCI enterprise portal mirrors the library's functions. Its books correspond to the systems and data bases built by the managers and experts of NMCI, who are themselves like authors, and doubtless have been well edited (by the major organizational commanders) before being published (by leaders of different functional areas).

Everyone in the community has access to the library, and community needs drive what will be included in and excluded from the library. Similarly, NMCI content standards would be based on the mission, goals, and objectives of the Navy, together with the guidance and policies of Congress and the Department of Defense. The Library of Congress Cataloging number (ISBN) assigns a unique-identifier for every American book written. We are going to use XML to assign a unique identifier to our metadata.

The analogy goes even further. Bringing people together with data and information, the library sets up reading circles and a reader review bulletin board. The library section managers serve as area knowledge managers, interconnecting their area of the stacks with other areas, and ensuring that researchers and decision makers have access to what they need when they need it. I think the librarian is a version of what was called the "Chief Web Officer" in Business Week's recent series on the 21st Century Corporation.

Now, most importantly, how do we persuade potential borrowers to use the library? Communities play a big part. "Book of the Month" clubs could push new ideas to communities, storytellers could share understanding, and researchers like me could gather ideas in our white papers and put them into action.

The Department is setting up an Enterprise Integration Office to perform the functions described in our library story in a virtual environment. This Office will be staffed with positions including Knowledge Process Manager, Intellectual Capital Manager, Knowledge Assurance Manager and Functional Area Knowledge Manager, all of whom will facilitate the sharing of information in their areas of expertise through virtual knowledge centers and communities of practice. To ensure full participation in these new initiatives, we know we must demonstrate their value to users.



U.S. Navy photos

CREATING THE KNOWLEDGE-CENTRIC ORGANIZATION

The Naval Service's ability to dominate future operations and to prevent wars or, if necessary, win them will depend increasingly on its ability to capitalize on the intellect and creativity of Navy and Marine Corps personnel while remaining adaptive and agile in mission execution. Knowledge-centric organizations are able to leverage their personnel and critical technology assets jointly, creating knowledge and then communicating it to the right person at the right time to solve problems. Ultimately, knowledge management strategies facilitate collaborative information sharing which optimizes strategic and tactical decision-making, resulting in more effective action.

A good example of collaboration is the Stennis Battle Group project. A battle group is an aircraft carrier accompanied by a group of escort and support vessels. Collaborating at sea is difficult. Limited bandwidth impairs our ability to connect a large group of worldwide users to a massive amount of information with sufficient speed and accuracy to facilitate tactical and strategic decisions. At present our fleet must accommodate varying IT systems and capabilities such as ship type limitations, bandwidth variance, a mix of legacy systems, and software version lags. Types of data transferred vary widely. For example, operational, weather and intelligence data vary in format, protocol, security classification, and national language. Further, although people at different levels of the chain-of-command must receive the same information to support tactical decisions, some data must be restricted to authorized personnel. In addition to managing ongoing situations, Battle Groups have struggled with the need to capture, archive, and later access key data and unique processes associated with repetitive operational deployments. Historically, it has been difficult to transfer lessons learned from one battle group exercise to another, and almost impossible to transfer and leverage knowledge efficiently.

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The Stennis Battle Group Project developed the capability for rapid and flexible collaboration, planning and execution of all Carrier Battle Group operations. The Project used commercial off-the-shelf products to ensure industry standards, leverage industry investment and avoid the high lifecycle costs of owning the equipment. These products also offer the ability to scale rapidly to a dynamic, multinational force. Built on a common taxonomy, the Project developed an instantaneous, context-oriented communications capability including audio, video, and application sharing.

Thanks to these capabilities and standards, the Project team was able to establish a classified Battle Group collaboration environment as a repository of the current tactical picture. This repository was accessible and replicable from all of the Battle Group ships and formed the basis for an expansive implementation of knowledge management that included development of the knowledge-centric concept of operations. Because of its success, the Stennis Battle Group Project is being emulated by other battle groups in both the Atlantic and Pacific Fleets.

Developing flexible knowledge-management systems to promote collaboration is also important under the sea. Only last June, the submarine USS Dolphin, cruising 400 feet below the surface of the Pacific, sent the first underwater e-mail from a moving vessel, using software from a Massachusetts contractor. As we are learning in knowledge management, technology is a necessary enabler, bringing with it new opportunities. Though band-width capabilities

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still limit the exchange of data and information both on and beneath the sea, we have taken a quantum leap in our ability to connect sailors and Marines, and families.

Knowledge-centric organizations don't just happen. The Naval Space and Warfare Systems Center in Charleston, South Carolina, began its journey toward becoming a knowledge-centric organization last July. The Center provides full-service engineering and technical support around the world. This includes designing, building, testing, fielding and supporting the Navy's command, control, communications, computers, intelligence, surveillance and reconnaissance systems—both those used today, and those planned for the future.

The Center uses a model created by the Department to assist Navy and Marine Corps organizations to capitalize on their knowledge assets and begin implementing knowledge management. This "Knowledge-Centric Organization" model emphasizes a balanced approach that addresses technology, process, content, culture and learning to ensure that no one facet dominates the program. Becoming knowledge-centric benefits all levels of an enterprise. Individuals will enjoy enhanced job performance, increased collaboration opportunities and facilitated learning. Organizations will experience enhanced mission performance, improved decision-making, greater use of expertise, and improvements to their processes. And the Navy as a whole will more effectively leverage organizational knowledge, increase innovation and creativity, and align strategic directions.

The journey toward the Knowledge-Centric Organization is divided into seven operational areas that focus on key elements, called OPAREAs. These are:

I: Building awareness, and understanding the knowledge management framework

II: Preparing the organization by exploring the cultural, leadership, communication and other organizational issues influencing knowledge-sharing and learning

III: Building the organization by defining strategic goals and required knowledge, metrics, and the design of key processes and supporting tools

IV: Sustaining the organization by developing processes that continuously acquire and disseminate knowledge, and monitoring and re-assessing these processes

V: Refining knowledge-brokering concepts and techniques to promote knowledge creation and sharing

VI: Building and mobilizing communities of practice

VII: Reviewing the journey, and creating a continuing vision for the future

The Center is currently working in OPAREA III to identify core processes, personnel, and information requirements; to centralize knowledge; and to design a communications strategy. The outcome of this work is a set of critical knowledge requirements linked to mission and strategic process. Additionally, a core communications strategy identifies and links key stakeholder groups and audiences. The communications strategy will be used and further developed as we implement the overall plan.

A major component of successful knowledge management is raising the awareness of everyone in the organization of the characteristics and benefits of a knowledge-centered organization. For the Center, this effort began with a pilot project and is expanding outward across the entire command. Other systems commands throughout the Navy are at various stages of the journey.

One valuable resource for this journey is the Knowledge-Centric Organization Toolkit, developed by the Navy with Arthur Andersen and including several articles contributed by the Institute for Knowledge Management. Over 15,000 copies of the Toolkit CD have been distributed worldwide across government and supporting industry and academic organizations. Responses to the Toolkit reflect its usefulness. Here is a testimonial from the Pension Benefit Guaranty Corporation, an example of knowledge-sharing in action:

The Knowledge-Centric Organization Toolkit CD-ROM has been a real gift from the Department of the Navy to the rest of us here in the federal government! Yesterday I had the need to look up some words on Communities of Practice for work we're doing here. I looked up at the KCO Journey color printout that I have stuck on the file cabinet above my computer. It's a talisman to me – my goal is to bring about a knowledge-focused organization here, also. So I booted up the CD-ROM and I found just what I needed. I know I'll be using it again. Sharing between federal agencies of the government is one of the most gratifying experiences I have encountered. It exemplifies trust, cooperation, even camaraderie. And re-use. Re-use is our focus here at PBGC. Free value. You've shared your rich repository of knowledge with us, so add us to the count, add our use of the material to the measure of the effectiveness of your work.

ACHIEVING A KNOWLEDGE-CENTRIC CULTURE

Long-term competitive advantage is built on cultural change. To achieve a knowledge-centric culture in which trust and respect facilitate information sharing and organizational learning, all members of our naval services need to strive to push the limits of their individual capacities. Simultaneously, the Department must provide the structure and support to enhance their capacities. Training and incentive programs are underway to bring about the needed cultural changes.

A virtual tool known as "systems-thinking," developed in conjunction with Arthur D. Little, is giving our sailors and Marines an opportunity to develop the skills necessary to transform complex information into effective decision-making. The systems-thinking approach comes out of the Massachusetts Institute of Technology's work on learning organizations. A diagnostic method for understanding cause and effect relationships among data and information, and identifying leverage points, systems thinking gives personnel a clearer perception of the patterns of change and the structure of systems, and thus facilitates appropriate responses.

In a broader sense, systems thinking has long been a part of the Department's engineering and technical functions. The MIT-developed technique for decision-making is consistent with military culture, and provides a way to improve our cognitive capabilities in our complex data and information environment. Today,

systems thinking is a tool used by many Navy and Marine Corps leaders and teams. Over the past five years, workshops and training sessions have been held throughout the Department. Last summer the Master Chief Petty Officer of the Navy brought together all the Master Chiefs of the Navy for a two-day systems thinking workshop. This group plans to insert the systems thinking workshop into all Petty Officer leadership training.

Knowledge Fair 2000 was the first enterprise-wide event focused on knowledge sharing. Over seventy-five projects representing Defense organizations around the world were exhibited. The event was co-hosted by the Under Secretary of the Navy, the Vice Chief of Naval Operations, and the Assistant Commandant of the Marine Corps. Close to 3,000 visitors created a continuous flow of energy throughout the day, with a groundswell of exchange and sharing. The opening ceremony, briefings and demonstrations were attended by hundreds of interested and enthusiastic people.

To facilitate sharing and learning, and support both individual and team successes, the Under Secretary of the Navy presented the first knowledge-sharing awards to seven outstanding projects. These included:

- The "Leading Knowledge Portal Concept" award, presented to Pacific Fleet's Knowledge Homeport, which mines, manufactures, and stores information for the purpose of making information decisions
- The "Outstanding Knowledge Expert System" award, presented to Virtual Naval Hospital for its delivery of expert medical information
- The "Outstanding Collaborative Knowledge Sharing Approach" award, presented to Naval Sea Systems Command for the multitude of knowledge management initiatives throughout the command

A second set of knowledge sharing awards was presented in San Diego last November at the Department's Connecting Technology Symposium. The rapidly increasing number of projects and programs recommended for these awards indicates the massive cultural change engendered by knowledge management. These awards both show how far we have come and inspire further progress. Additional awards will be presented at the Connecting Technology Symposium this May in Virginia Beach, Virginia, and next August in Washington at the Department's e-Business Knowledge Fair.

KNOWLEDGE SUPERIORITY AS A WAY OF LIFE

Knowledge superiority is clearly essential to the Department's future. We are committed to developing a knowledge-centric infrastructure, creating knowledge-centric organizations, and achieving a knowledge-centric culture that will give us that superiority. The integration of information technology, information management and knowledge management promises to make this vision of capabilities and coordination a reality in the near future:

Among the forward-deployed forces of the Navy are three units engaged in vital operations in the Arabian Gulf, the Adriatic Sea, and the Sea of Japan. Data mining is underway among ships that are oceans apart. An automated analysis tool discovers a disquieting premature part failure pattern. In-service engineering support team members at different locations are quickly alerted to the nascent trend by an analysis software program, and connected through voice and video software. A 3D digital product-process model is called up from the original equipment manufacturer's factory server. Factory and government design engineers run a virtual system simulator using the ships' equipment data logs which have been accessed and downloaded from the ships at the click of a mouse. An unexpected sensitivity to the higher than normal levels of humidity is identified as the cause of the emerging critical part failure.

After a collaborative exchange among the engineering team members, a subtle design parameter change is made digitally and thousands of replications of the web-based simulator are run to verify the completeness of the re-designed component solution. The program manager, vacationing in her secluded mountain cabin, is alerted to the last 30 minutes of work via an e-mail delivered to her personal mobile communication device—tagged as urgent by the team members. She connects to the intranet and the team agrees to download the simulation through the family's satellite dish onto the high performance Play Station 2 visualization tool. There is no need to worry about eavesdropping, or theft of the information, as all transmissions are encrypted.

All the design and production team members across 16 time zones, are able to view simultaneously the 3D simulation, discuss the necessary changes and settle on the proposed design. The collaborating suppliers have entered the necessary changes into their automated order fulfillment system and have initiated Priority One shipping alert packaging, and re-routing of the commercial trucking and air express companies' planned pick-up and delivery schedules. The new parts are fabricated, integrated, shipped, received, and installed before the old parts actually break, thereby averting the loss of critical fighting capability that would affect the readiness of the battle groups. The various financial and inventory transactions of the shippers, suppliers, integrators, manufacturer, and engineers, as well as the ships and Fleets, are automatically updated behind the scenes without wasteful intermediary transactions, and leadership is notified of the change.

As our ships steam ahead, continuing their uninterrupted operations and ensuring Naval readiness in this new era, we are confident that no foe, present or future, will match our knowledge or our ability to apply it. Knowledge superiority is becoming a Navy way of life.

U.S. Navy photos: pp. 46-47 (left to right): The Pacific Ocean, March 11, 2001, USS Essex; The Pacific Ocean, February 7, 2001, USS Abraham Lincoln; The Arabian Gulf, July 30, 2000, Combat Direction Center aboard USS George Washington; Lumut, Malaysia, August 16, 2000, Navy Diver, USS Safeguard; (bottom) Fort A.P. Hill, Va., August 2, 1997, Member of Navy parachute team; pp. 52-53 (left to right): North Chicago, Ill., March 23, 2001, Machinists at Naval Training Center; The Mediterranean Sea, May 10, 2000, Inspecting screw aboard USS Grasp; Yigo, Guam, May 2, 2000, parachute training; The Sea of Japan, November 1, 2000, aboard USS Chancellorsville, Mayport, Fla; p. 57: September 22, 1999, USS John F. Kennedy.

Endnotes

[1] *Navy Knowledge Superiority Project: Developing a Navy Information Strategy for Knowledge Superiority*, United States Naval Academy, Department of the Navy (October 1999).